REMARKS

Claims 1 and 3-22 are pending in this application. Claims 1 and 7 are the independent claims. Claim 2 was previously cancelled. Reconsideration and allowance of the present application is respectfully requested.

Applicant appreciates the Examiner's acknowledgement and consideration of the drawings filed March 29, 2005.

Applicant appreciates the Examiner's acknowledgement and receipt of the certified priority documents.

Error in the Office Action

With regard to the 35 USC §103 rejection on page 3 of the Office Action, Applicant notes that the Examiner intended to reject only claims 1, 5, 7-8, 11-12 and 14-20 using Jacobus, Moore and Rice, as claims 21-22 are rejected on page 8 of the Office Action using a different combination of references. For this reason, the Examiner should not list claims 21-22 in the 35 USC §103 rejection on page 3 of the Office Action.

Example Embodiments

As described on at least page 3, lines 13-32 of Appellant's as-filed application, example embodiments provide for different "virtual environments" 4 (see at least FIG. 3 of the instant application) that may be created without modeling the entire environment from the beginning. This is accomplished via a type of *building block* functionality, as provided by the recited inventions of independent claims 1 and 7. As described on at least page 3, line 13 through page 4, line 26 of the instant application,

a "main virtual anatomic environment" 1 (included in the main virtual anatomic environment modeler 15, as shown in FIG. 3 of the instant disclosure) is provided, which may represent an internal cavity of a living being (e.g., the "main virtual anatomic environment" 1 may represent for instance an abdominal cavity or a chest cavity). As described on at least page 3, line 33 through page 4, line 18, a "library" 3 of "local anatomic environments" 2 is also provided, where ***each*** "local anatomic environment" 2 may represent an individual variation of an internal area of a living being (the "local anatomic environment" being for instance an organ which includes corresponding arteries, veins, and ducts). Specifically, ***each*** "local anatomic environment" 2 may individually represent a *different configuration of a same organ* with its corresponding arteries, veins, and ducts, as they would be found in a living being (i.e., many "local anatomic environments" 2 may be created for *one organ*, ***each*** "local anatomic environment" 2 representing a different position and/or shape of the organ, or a different configuration of arteries, veins and ducts that may be entering/exiting the organ). As recited in claims 1 and 7, various "virtual environments" 4 (a *complete model* of an area of a living being) may then be created by including various "local anatomic environments" 2 in a "main virtual anatomic environment" 1. In this sense, the "virtual environment" 4 is the *finished product*, whereas the "main virtual anatomic environment" 1 (for instance an internal cavity, such as a chest cavity) and the different variations of "local anatomic environments" 2 (for instance the organs found in a chest cavity) are *building blocks* that may be combined to produce the *finished product* (the completed model).

It is important to note that recited claims 1 and 7 provide the benefit of needing to model each one variation of a "local anatomic environment" 2 ***only once***, and

thereafter the *building block* functionality of claims 1 and 7 allow for a great number of "virtual environments" 4 (the completed model) to then be created by swapping out different "local environments" 2 within a "main virtual anatomic environment" 1 (as opposed to separately modeling each component of an entire "virtual anatomic environment" 4, including many combinations of separately configured "local anatomic environments" 2, from the beginning).

As described on page 4, lines 3-18 of the instant application, and as claimed in dependent claims 3 and 9, the "local anatomic environments" 2 (i.e., the *building blocks* of the completed model) may be randomly selected, such that the probability of randomly selecting a certain "local anatomic environment" 2 may correspond with the degree of occurrence that the "local anatomic environment" 2 exists in living beings, to provide a realistic simulation of a "virtual environment" 4 (i.e., the *completed model*).

Rejections under 35 U.S.C. §103 – *Jacobus in view of Moore and further in view of Rice*

Claims 1, 5, 7-8, 11-12 and 14-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,769,640 ("Jacobus") in view of U.S. Patent No. 5,771,181 ("Moore"), and further in view of U.S. Patent No. 6,310,619 ("Rice"). This rejection is respectfully traversed.

With regard to independent claim 1, the Examiner asserts that Jacobus discloses all of the claim limitations with the exception that Jacobus does not disclose the feature of the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing

anatomic variations occurring in living beings including selected local anatomic environments in said main virtual anatomic environment to form said virtual anatomic environment. The Examiner asserts that Moore teaches all of the local anatomic environments of the library being separately modeled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being, and selecting a local anatomic environment from a predefined library including a set of two or more local anatomic environments. The Examiner asserts that Rice teaches the selection of different combinations of selected local anatomic environments in the main virtual anatomic environment, allowing generation of different virtual environments, each virtual environment representing anatomic variations occurring in living beings including the selected local anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment.

Applicant asserts that Jacobus in view of Moore and further in view of Rice does not teach or suggest "selecting a local anatomic environment from a predefined library comprising a set of two or more local anatomic environments, all of the local anatomic environments of the library being *separately modelled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being*," as recited in claim 1. Applicant further asserts that neither Jacobus, nor Moore, nor Rice, teach or suggest the *building block* functionality of a "main virtual anatomic environment," a library of "local anatomic environments" (each separate "local anatomic environment" capable of representing a different anatomic variation of a *same internal area* of a living being) and a "virtual anatomic environment" that combine to provide "*the selection of different combinations of selected local anatomic*

environments in said main virtual anatomic environment thereby allowing generation of different virtual environments," as recited claim 1.

With regard to Jacobus, Jacobus teaches a method of measuring and recording sights and sounds of a medical procedure, for accurate play back of the recording to generate new information to emulate responses to alternative actions taken by a surgeon trainee during simulation. The Jacobus method appears to be best summarized in column 4, lines 30-38, which cites two basic functions of the method. Specifically, the first function of Jacobus is "*measuring and recording*" of an actual surgery, and the second function is "*accurately playing back . . . using the recorded data*." Any images not fully recorded during the measuring / recording of the medical procedure itself, may be supplemented with miscellaneous images taken from other "medical diagnostics or image modalities," described in column 4, lines 5-9 of Jacobus to include CT data, PET data, MRI data, etc.

Applicant asserts that the *measuring*, *recording*, and *accurate playback of recorded data images* (both images that are taken during the recording of the initial procedure, as well as images taken during "medical diagnostics"), is not providing a library of "local anatomic environments," all of the local anatomic environments being "*separately modelled three-dimensional models* ***each*** *representing an individual anatomic variation in a local internal area of a living being,*" as recited in claim 1. Specifically, Jacobus does not disclose or fairly suggest that ***each*** "local anatomic environment" serves the purpose of representing a different individual anatomic variation. Rather, Jacobus discloses, in essence, separately modeling individual "virtual environments," where each one "virtual environment" includes images that happen to be recorded during the one surgery (or, images that happen to be

supplemented by a random collection of medical diagnostic / image modality images, as described in column 4, lines 1-9 of Jacobus). Therefore, ***each*** "local anatomic environment" (i.e., each organ, for instance) of Jacobus does not represent "an individual anatomic variation in a local internal area of a living being." Rather, the "local anatomic environments" of Jacobus may, at best, capture ***some*** miscellaneous "anatomic variations," simply by luck or chance. Additionally, it is quite possible that many of the "local anatomic environments" of Jacobus may represent *the same* "anatomic variation" (for instance, of the collection of images of a heart in Jacobus, many of the images may represent *the same* anatomic variation of the heart). Therefore, it is not at all accurate to say that Jacobus teaches or suggests separately modeled "local anatomic environments" where ***each*** model represents an anatomic variation. For at least these reasons, Applicant asserts that Jacobus does not teach or suggest "all of the local anatomic environments of the library being *separately modelled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being*," as recited in claim 1.

Additionally with regard to Jacobus, because the "local anatomic environments" do not ***each*** represent an individual anatomic variation, Jacobus therefore does not disclose or suggest selecting from a "library" of "local anatomic environments." Specifically, Jacobus does not teach or suggest "selecting a local anatomic environment from a predefined *library comprising a set of two or more local anatomic environments*, all of the local anatomic environments of the library being *separately modelled three-dimensional models* ***each*** *representing an individual anatomic variation in a local internal area of a living being*," as recited in claim 1. Specifically, Jacobus does not disclose a "library" where *every single* (i.e., ***each***) "local anatomic

environment" serves the purpose of representing a distinct individual anatomic variation. For at least these reasons, Applicant asserts that Jacobus does not teach or suggest "selecting a local anatomic environment from a predefined *library comprising a set of two or more local anatomic environments*, all of the local anatomic environments of the library being *separately modelled three-dimensional models* ***each*** *representing an individual anatomic variation in a local internal area of a living being,*" as recited in claim 1.

Furthermore with regard to Jacobus, Jacobus does not teach or suggest a *building block* functionality of a "main virtual anatomic environment," a library of "local anatomic environments" and a "virtual anatomic environment." The *building block* functionality allows for the creation of many "virtual environments" (i.e., the completed model) by substituting separately modelled "local anatomic environments" (***each*** separate "local anatomic environment" representing an anatomic variation of an internal area of a living being) into a respective "main virtual anatomic environment" (i.e., a shell, such as an internal cavity of a living being). Cost savings of such *building block* functionality allows many "virtual environments" to be created by swapping out various "local anatomic environments" to create a final "virtual environment." Because Jacobus does not disclose this *building block* functionality, Applicant therefore asserts that Jacobus does not teach or suggest "including the selected local anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment, *the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings*," as recited in claim 1.

With regard to Moore, Applicant asserts that a review of Moore indicates that Moore does not remedy the deficiencies of Jacobus, as described above. Moore discloses a system for simulating medical procedures by providing "realistic tactile feedback forces" during the simulation. Specifically, the overriding focus of Moore is to provide a simulator that offers the tactile feedback forces of "tugging, tearing, cutting, clipping, stapling, pulling, pushing, grasping, probing, and making contact"[1] as well as "turning, twisting, torquing, mounting"[2] of equipment in a user's hands while using the simulator, as described in column 2, line 66 to column 3, line 3. Moore only superficially mentions (only at column 3, line 6) that a *video* display is part of the simulation, though virtually no additional discussion of any *video* or *visual* display is offered throughout the remainder of the Moore reference. In column 3, lines 16-24 Moore discloses the use of high capacity memory to store different anatomical "pavilions," which are areas of the body upon which a number of minimally invasive procedures may be performed. In column 5, lines 54-67, Moore discloses that the high capacity memory stores "indicia" representing physical characteristics of the simulated environment, the "indicia" including "internal body landscapes, geometries of organs, their locations within body cavities, their physical characteristics such as resilience, resistance to cutting, pulling, tugging and the like."[3] In column 6, line 53 to column 7, line 10 of Moore, Moore discloses that the simulator allows a user to optionally select from multiple simulated procedures and instruments. When selection of the procedure is accomplished, sensors in the simulator are conditioned to sense parameters such as the position and direction of movement of a simulated

[1] See column 2, line 66 to column 3, line 1 of Moore.
[2] See column 3, lines 2-3 of Moore.
[3] See column 5, lines 61-64 of Moore.

instrument.[4] A temporary memory 53 (sensing the movement of the user) is coupled with the high capacity memory 55 (storing the "indicia" of physical characteristics of the simulated environment) in a "dynamic engine" 56[5] to then provide the overall simulation and "tactile feedback forces" to the user. Because the overriding purpose of Moore is to provide "realistic tactile feedback forces" in a medical procedure simulator, and because Moore only superficially mentions the use of a video display (it is mentioned once, in column 3, line 6), a person of ordinary skill in the art would not be motivated to combine Moore with Jacobus (a system for measuring *sights and sounds* of a medical procedure, for accurate *visual* playback of the procedure) to make claim 1 (*visual* simulation of minimally invasive surgery) obvious. For at least these reasons, Jacobus in view of Moore does not teach or suggest "all of the local anatomic environments of the library being *separately modelled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being*" and "including the selected local anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment, *the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings*," as recited in claim 1.

Applicant further asserts that even if Moore were to be combined with Jacobus (Applicant does not concede, or even believe that such a combination could be made), such a combination still would not teach or suggest all of the limitations of claim 1. Moore only discloses a system for simulating medical procedures by providing

[4] See column 6, lines 61-66 of Moore.
[5] See column 7, lines 3-6 of Moore.

"*realistic tactile feedback forces*" using "indicia" representing physical characteristics and geometries of internal body cavities and organs (the "indicia" being stored in high capacity memory). No portion of Moore discloses how *visual* simulation of the internal body cavities and organs may be accomplished. And certainly no portion of Moore discloses a library of "local anatomic environments" where each local anatomic environment is a "separately modelled three-dimensional [model] ***each*** *representing an individual anatomic variation in a local internal area of a living being,*" as recited in claim 1. Specifically, Moore does not disclose a library of "local anatomic environments" where *every* local anatomic environment represents a *different* three-dimensional model of an individual anatomic variation, allowing for a great number of "main virtual anatomic environments" without separately modeling the entire environment from the beginning. To provide an illustrative example, **Moore does not disclose or suggest providing, for instance, five separate "local anatomic environments" of a heart (the heart being an example of an "internal area"), where every one of the five separate models *each* serves the purpose of representing a *different* anatomic variation of the heart (i.e., Moore does not disclose that no two models of the heart are identical, where *each* model serves the purpose of representing a unique, separate anatomic variation of the heart)**. For at least these reasons, any combination of Jacobus and Moore and not teach or suggest "selecting a local anatomic environment from a predefined library comprising a set of two or more local anatomic environments, all of the local anatomic environments of the library being *separately modelled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being,*" as recited in claim 1.

Because Moore does not teach or suggest a "local anatomic environment," as defined by claim 1, Applicant further asserts that Moore does not teach or suggest a *building block* functionality of a "main virtual anatomic environment," a library of "local anatomic environments" and a "virtual anatomic environment," as recited in claim 1. The *building block* functionality allows for the creation of many "virtual environments" (i.e., the completed model) by substituting separately modelled "local anatomic environments" (***each*** separate "local anatomic environment" representing an anatomic variation of an internal area of a living being) into a respective "main virtual anatomic environment" (i.e., a shell, such as an internal cavity of a living being). However, because Moore provides almost no discussion whatsoever related to *how* the visual aspects of a simulator may be combined, Moore discloses none of these features. For at least these reasons, any combination of Jacobus and Moore does not teach or suggest "including the selected local anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment, *the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings*," as recited in claim 1.

With regard to Rice, Applicant asserts that a review of Rice indicates that Rice does not remedy the deficiencies of Jacobus in view of Moore, as described above. Rice discloses a three-dimensional, virtual reality, tissue-specific model of a living being, as described in column 4, line 54 to column 5, line 30. As described in column 5, lines 16-25, the model may include a database of cross-section images of male and female human bodies taken from CT, MRI images, and cryosection images to develop a

database of images used to create *tissue-specific models*. Column 5, lines 3-8 provides an example list of five "*tissue-specific models*," the models including 1) compact and calcious bone, 2) skeletal and smooth muscle, 3) hyaline, fibrous, elastic and articular cartilage, 4) dense regular and irregular connective tissue (tendons, ligaments, and facia), and 5) central and peripheral nervous tissue. As described in column 5, lines 8-12, each of these *tissue-specific models* is presented in an anatomically correct orientation, as they relate to the other *tissue-specific models*. As described in column 5, lines 10-12, an example of an anatomically correct orientation includes, for instance the biceps brachii (the *tissue-specific model* of "skeletal and smooth muscle") with its proper anatomical connection to the humorous, ulna, and radius (the *tissue-specific model* of "compact and calcious bone"), as shown in FIG. 1 of Rice. Applicant submits that while the database of CT, MRI and cryosection images of Rice (see column 5, lines 13-29 of Rice) allows some variability in the modeling of local internal areas of humans (such as the use of male organs, or female organs, as described in column 5, lines 16-20), the overriding purpose of Rice is to create an ***overall composite model*** composed of individual ***tissue-specific models*** of bone, muscle, cartilage, connective tissue, and/or nervous tissue that the user may decide to include or exclude. More specifically, Applicant asserts that while Rice allows tissue-specific models to be modified to display some anatomic variation of local internal areas of humans, Rice does not teach or suggest the separate modeling of "local anatomic environments" where ***each*** model individually represents an anatomic variation. Further, Rice does not disclose a "library" of "local anatomic environments," where ***each*** "local anatomic environment" serves the purpose of representing an individual anatomic variation. Therefore, Applicant asserts that neither Jacobus, nor Moore, nor Rice, either singly or

in combination with each other, teaches or suggests "selecting a local anatomic environment from a predefined library comprising a set of two or more local anatomic environments, all of the local anatomic environments of the library being *separately modelled three-dimensional models each representing an individual anatomic variation in a local internal area of a living being*," as recited in claim 1.

Applicant further asserts that because Rice does not teach or suggest a library of "local anatomic environments" each representing an anatomic variation, Rice therefore does not teach or suggest the *building block* functionality of a "main virtual anatomic environment" that may include different "local anatomic environments" to create various "virtual anatomic environments." Rather, Rice only discloses creating a ***composite model*** that may include / exclude bone, muscle, cartilage, connective tissue, and/or nervous tissue where *some* variation in local internal areas may be displayed using various CT, MRI and cryosection images. However, neither Jacobus, nor Moore, nor Rice, either singly or in combination with each other, teach or suggest "including the selected local anatomic environment in said main virtual anatomic environment to form said virtual anatomic environment, *the selection of different combinations of selected local anatomic environments in said main virtual anatomic environment thereby allowing generation of different virtual environments, each different virtual environment representing anatomic variations occurring in living beings*," as recited in claim 1.

Furthermore, because Rice discloses a three-dimensional *visual* model formed through the use of cross-sectional and cryosectional images, a person or ordinary skill in the art would not be motivated to combine Moore (a simulation of "*realistic tactile feedback forces*," with almost no discussion of the visual aspects of a simulator) with

Rice to make claim 1 (*visual* simulation of minimally invasive surgery) obvious. Moore does not teach or suggest or even relate to *how* the visual aspects of a simulator are combined, and therefore a person of ordinary skill in the art would not be motivated to combine Moore with Rice. For at least this additional reason, Jacobus in view of Moore and further in view of Rice does not teach or suggest all of the limitations of claim 1.

With regard to independent claim 7, Applicant asserts that these claims contain features similar to independent claim 1 such that at least the same arguments can be made for claim 7.

For at least the reasons stated above related to independent claims 1 and 7, Applicant asserts that these claims are patentable. Due at least to the dependence of claims 5, 8, 11-12 and 14-22 on the independent claims, Applicant also asserts that these claims are patentable. Therefore, Applicant requests that this art ground of rejection of these claims under 35 U.S.C. §103 be withdrawn.

Rejections under 35 U.S.C. §103 – *Jacobus in view of Moore and further in view of Rice and Pugh*

Claims 21 and 22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,769,640 ("Jacobus") in view of U.S. Patent No. 5,771,181 ("Moore"), and further in view of U.S. Patent No. 6,310,619 ("Rice") and U.S. Patent No. 6,428,323 ("Pugh"). This rejection is respectfully traversed.

With regard to claim 21, the Examiner uses Pugh to teach that components in the local anatomic environment are expluded in the main virtual anatomic environement. Applicant asserts that Jacobus in view of Moore and further in view of

Rice and Pugh do not teach or suggest "*wherein components included in the local anatomic environment are excluded in the main virtual anatomic environment*," as recited in claim 21.

With regard to Pugh, Pugh discloses a tangible, manikin type of anatomic simulator that students may touch, allowing students to perform exams on the manikin. Column 3, lines 35-45 describes that the manikin simulator includes removable anatomical parts such as a cervix, a uterus, ovaries, etc. The removable parts may be removed for better viewing by the students. Pugh does not teach or suggest or even apply to a "computer based visual simulation," as recited in claim 1, as Pugh instead discloses a tangible manikin. Therefore, Pugh does not teach or suggest a "local anatomic environment" or a "main virtual anatomic environment" of a computer based visual simulator, as recited in base claim 1. For at least these reasons, Pugh is almost entirely inapplicable to base claim 1 and dependent claim 21. And for at least these reasons, Pugh certainly does not teach or suggest "*wherein components included in the local anatomic environment are excluded in the main virtual anatomic environment*," as recited in claim 21.

A review of Jacobus, Moore and Rice indicate that none of these references remedy the disclosure and suggestion deficiencies of Pugh as described above, nor does the Examiner rely on Jacobus, Moore or Rice for this purpose.

With regard to claim 22, Applicant asserts that claim 22 contains features similar to claim 21 such that at least the same arguments can be made.

For at least the reasons stated above related to claims 21-22, Applicant asserts that these claims are patentable. Therefore, Applicant respectfully requests that this art ground of rejection of these claims under 35 U.S.C. §103 be withdrawn.

Rejections under 35 U.S.C. §103 – *Jacobus in view of Moore and further in view of Rice and Kurzweil*

Claims 3-4, 6, 9-10 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,769,640 ("Jacobus") in view of U.S. Patent No. 5,771,181 ("Moore") in view of U.S. Patent No. 6,310,619 ("Rice"), and further in view of U.S. Patent 6,692,258 ("Kurzweil"). This rejection is respectfully traversed.

With regard to independent claims 1 and 7, Applicant asserts that these claims are patentable over Jacobus in view of Moore and further in view of Rice for at least the reasons stated above. Applicant asserts that a review of Kurzweil indicates that Kurzweil does not remedy the deficiencies of Jacobus in view of Moore and further in view of Rice as described above, nor does the Examiner rely on Kurzweil for this purpose. Therefore, Applicant asserts that claims 1 and 7 are patentable over all combinations of Jacobus, Moore, Rice and Kurzweil.

For at least the reasons stated above, Applicant asserts that claims 1 and 7 are patentable. Due at least to the dependence of claims 3-4, 6, 9-10 and 13 on claims 1 and 7, respectively, Applicant also asserts that these claims are patentable. Therefore, Applicant respectfully requests that this art ground of rejection of these claims under 35 U.S.C. §103 be withdrawn.

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CONCLUSION

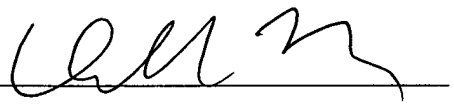
In view of the above remarks and amendments, Applicant respectfully submits that each of the rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Pursuant to 37 C.F.R. §1.17 and 1.136(a), Applicant hereby petitions for a three (3) month extension of time for filing a reply to the outstanding Office Action and submit the required $1,110 extension fee herewith.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,
HARNESS, DICKEY, & PIERCE, P.L.C.

By 
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